

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

Device Under Test Description	
Manufacturer	JVC Kenwood Corporation Kenwood USA Corporation
Manufacturer Contact	Donald E. Wingo, 678-474-4719
Product Name	TK-5720, Mobile Subscriber Unit - VHF
Frequency Band	136 – 174 MHz
Installed Options	P25 Conventional P25 Trunking P25 DES (multi-keys) encryption P25 AES (multi-keys) encryption
Installed Vocoder	Enhanced Full Rate

Test Description
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.3.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Interoperability

Laboratory Information	
P25 CAP Laboratory Number	P25CAP081016
Date(s) of Test	3 - 9 May 2011 / 15 June 2011
Date of Issue	1 July 2011
P25 CAP Laboratory Number	P25CAP081016
Date(s) of Test	14 April 2011
Date of Issue	18 April 2011
P25 CAP Laboratory Number	P25CAP081017
Date(s) of Test	15 August 2011
Date of Issue	18 August 2011
P25 CAP Laboratory Number	P25CAP081016
Date(s) of Test	29 August 2011
Date of Issue	31 August 2011

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

Informative References	
Date	Title
March 2010	P25-CAB-CAI_TEST_REQ

Other Devices Tested with: Kenwood TK-5x20 (Model Class*)

Manufacturer	Product Name, Definition, and Unique ID	Installed Options
Motorola	ASTRO 25 System	V7.9
Harris	MASTR V	System Release PR9C
Cassidian (EADS)	CORp25	P25V11_05.E25.03

**Kenwood Model Class is defined as all subscriber units, mobile and portable, that use common software / firmware and hardware design as related to interoperability testing.*

Performance Test Cases and Results

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance		DTR-TIMCO081016 TK-5720	
Performance – Conventional Receiver Tests TK-5720 (VHF)			
Test Case	Description	Requirement	Results
2.1.4	Reference Sensitivity	≤ -116 dBm	P1
2.1.5	Faded Reference Sensitivity	≤ -108 dBm	P2
2.1.6	Signal Delay Spread Capability	≥ 50 us	P3
2.1.7	Adjacent Channel Rejection	≥ 60 dB	P4
2.1.8	Co-Channel Rejection	≥ 9 dB	P
2.1.9	Spurious Response Rejection	≥ 80 dB	P
2.1.10	Intermodulation Rejection	≥ 75 dB	P
2.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P
2.1.17	Late Entry Unsquelch Delay No Talk Group or Encryption Talk Group Only Encryption Only Both (On Clear or Encrypted Channel)	≤ 125 ms ≤ 370 ms ≤ 370 ms ≤ 460 ms	P P P P
2.1.18	Receiver Throughput Delay	≤ 125 ms	P

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance		DTR-TIMCO081016 TK-5720	
Performance – Conventional Transmitter Tests TK-5720 (VHF)			
Test Case	Description	Requirement	Results
2.2.8	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
2.2.12	Transmitter Power Attack Time Encoder Attack Time	≤ 50 ms	P
		≤ 100 ms	P
2.2.14	Transmitter Throughput Delay	≤ 125 ms	P
2.2.15	Frequency Deviation for C4FM High Level Signal Deviation Low Level Signal Deviation	$2544 \leq fdev \leq 3111$ Hz	P
		$848 \leq fdev \leq 1037$ Hz	P
2.2.16	Modulation Fidelity	$\leq 5\%$	P
2.2.18	Transient Frequency Behavior		
	Time Interval t1 = 5 ms	$\{\Delta f\} \leq 12.5$ kHz	P
	Time Interval t2 = 20 ms	$\{\Delta f\} \leq 6.25$ kHz	P
	Time Interval t3 = 5 ms	$\{\Delta f\} \leq 12.5$ kHz	P

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance		DTR-TIMCO081016 TK-5720	
Performance – Trunked Receiver Tests TK-5720 (VHF)			
Test Case	Description	Requirement	Results
2.1.4	Reference Sensitivity	≤ -116 dBm	P1
2.1.5	Faded Reference Sensitivity	≤ -108 dBm	P2
2.1.6	Signal Delay Spread Capability	≥ 50 us	P3
2.1.7	Adjacent Channel Rejection	≥ 60 dB	P4
2.1.8	Co-Channel Rejection	≥ 9 dB	P
2.1.9	Spurious Response Rejection	≥ 80 dB	P
2.1.10	Intermodulation Rejection	≥ 75 dB	P
2.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance		DTR-TIMCO081016 TK-5720	
Performance – Trunked Transmitter Tests TK-5720 (VHF)			
Test Case	Description	Requirement	Results
2.2.8	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
2.2.12	Transmitter Power Attack Time Encoder Attach Time	≤ 50 ms	P
		≤ 100 ms	P
2.2.14	Transmitter Throughput Delay	≤ 125 ms	P
2.2.15	Frequency Deviation for C4FM High Level Signal Deviation Low Level Signal Deviation	$2544 \leq fdev \leq 3111$ Hz	P
		$848 \leq fdev \leq 1037$ Hz	P
2.2.16	Modulation Fidelity	$\leq 5\%$	P
2.2.18	Transient Frequency Behavior		
	Time Interval t1 = 5 ms	$\{\Delta f\} \leq 12.5$ kHz	P
	Time Interval t2 = 20 ms	$\{\Delta f\} \leq 6.25$ kHz	P
	Time Interval t3 = 5 ms	$\{\Delta f\} \leq 12.5$ kHz	P

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance		DTR-TIMCO081016 TK-5720	
Performance – Trunked Transmitter Tests TK-5720 (VHF)			
Test Case	Description	Requirement	Results
2.3.1	Trunking Control Channel Slot Time		
	45 ms Slot		
	Encode Attack Time	$2.0\text{ ms} \leq t \leq 11.65\text{ ms}$	P
	RF Power Attack Time	$0.0\text{ ms} \leq t \leq 11.65\text{ ms}$	P
	RF Turn Off Time	$\leq 1.57\text{ ms}$	P
2.3.2	Trunking Request Time (45 ms Slot)	$\leq 167\text{ ms}$	P
2.3.3	Trunking Voice Access Time	$< 1000\text{ ms}$	P5
2.3.5	Transmit Time to Key on Traffic Channel		
	RF TX time to Key – Working Channel	150 ms	P
	Encoder Transmit Time	150 ms	P

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

Interoperability Test Cases and Results

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.3.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Interoperability		DTR-TIMCO081016M 5X20	DTR-P25CAP081017 -1110809K01	DTR-TIMCO081016 5X20
Kenwood Model Class – TK-5x20		Motorola	Harris	Cassadian
Test Case	Description	Result		
2.2.1	Full Registration			
2.2.1.4.1	Test Case 1 – Valid Registration			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.1.4.2	Test Case 2 – Denied or Refused Registration			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.1.4.3	Test Case 3 – Unverified Registration			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.2	Group Voice Call			
2.2.2.4.1	Test Case 1 – Group Call Granted			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.2.4.2	Test Case 2 – Group Call Denied			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.2.4.3	Test Case 3 – Group Call Request Queued			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

2.2.3	Unit-to-Unit Voice Call			
2.2.3.4.1	Test Case 1 – Unit-to-Unit with Target Availability Check			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.3.4.2	Test Case 2 – Unit-to-Unit with Target Availability Check Denied by Target			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.3.4.3	Test Case 3 – Unit-to-Unit with Target Availability Check – Traffic Assignment After Target Availability Check			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.3.4.4	Test Case 4 – Unit-to-Unit with Target Availability Check – Traffic Assignment Before Target Availability Check			
	Home Configuration	NA1	NA2	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.3.4.5	Test Case 5 – Unit-to-Unit Call without Target Availability Check			
	Home Configuration	N1	N2	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.3.4.6	Test Case 6 – Unit-to-Unit Call Queued without Target Availability Check			
	Home Configuration	N1	N2	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.3.4.7	Test Case 7 – Unit-to-Unit Call Denied			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

2.2.4	Broadcast Voice Call			
2.2.4.4.1	Test Case 1 – Broadcast Voice Call			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.5	Affiliation			
2.2.5.4.1	Test Case 1 – Radio Permitted to Affiliate with New Group			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.5.4.2	Test Case 2 – Radio Denied Affiliation to New Group			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.6	Announcement Group Call			
2.2.6.4.1	Test Case 1 – Collection of Talk Groups Receive Call			
	Home Configuration	P	N3	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.7	Emergency Alarm			
2.2.7.4.1	Test Case 1 – Emergency Alarm			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.8	Emergency Group Call			
2.2.8.4.1	Test Case 1 – Emergency Call			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6
2.2.10	Encryption			
2.2.10.4.1	Test Case 1 – Call Privacy for Encrypted Call			
	Home Configuration	P	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6

Project 25 Compliance Assessment Program

Summary Test Report

TK-5720 Mobile Radio, VHF

STR-KWRD-TK5720-1011

2.2.11	Intra-Location Registration Area Roaming			
2.2.11.4.1	Test Case 1 – Idle Radio			
	Home Configuration	I1	P	P
	Inter-System Roaming Configuration	N4	N5	N6
	Inter-WACN Roaming Configuration	N4	N5	N6

Model Class: TK-5x20 Subscriber	
Product Name, Definitions and Unique ID	Model Number and Installed Options
TK-5720 VHF Portable (K)	FW Ver. 2.01 – 2.04; Trunking, Encryption

Test Case Results Definitions	
No Test Performed	NT
Test Does Not Apply to the Test Object	N/A
Test Object Meets Requirements	P (Pass)
Test Object Does Not Meet Requirements	F (Fail)
Test Object is Not Conclusive	I (Inconclusive)
Comments	
P1: Kenwood subscriber passes Reference Sensitivity specification for C4FM and Simulcast modulations.	
P2: Kenwood subscriber passes Faded Reference Sensitivity specification for C4FM and Simulcast modulations.	
P3: Kenwood subscriber passes Signal Delay Spread Capability specification for C4FM (≥ 50 us) and Simulcast (≥ 80 us) modulations.	
P4: Kenwood subscriber passes Adjacent Channel Rejection specification for C4FM and Simulcast modulations.	
P5: Trunking Voice Access Time will vary dependent on actual system design and implementation.	
I1: Motorola test case 2.2.11.4.1 indicated inconclusive due to the test being attempted to allow roaming between the trunking system and a service monitor being used as a second site. The trunking system would not recognize the service monitor as a legitimate site.	
N1: Test cases 2.2.3.4.5 and 2.2.3.4.6 are not supported by Motorola FNE.	
N2: Test cases 2.2.3.4.5 and 2.2.3.4.6 are not supported by Harris FNE.	
N3: Test case 2.2.6.4.1 is not supported by Harris FNE.	
N4: Motorola infrastructure does not support Inter-System or Inter-WACN roaming.	
N5: Harris infrastructure does not support Inter-System or Inter-WACN roaming.	
N6: Cassidian infrastructure does not support Inter-System or Inter-WACN roaming.	
NA1: Test case 2.2.3.4.4 is not applicable to Motorola FNE; see results of test case 2.2.3.4.3.	
NA2: Test case 2.2.3.4.4 is not applicable to Harris FNE; see results of test case 2.2.3.4.3.	
N/A1: "Not Applicable" test	

Project 25 Compliance Assessment Program
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TK-5720 Mobile Radio, VHF
STR-KWRD-TK5720-1011

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